Regional Airspace Initiatives in Europe

Neil Planzer
Air and Space Operations, Headquarters U.S. Air Force

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Introduction

Shortly after the dissolution of the Warsaw Pact, President William Clinton established a small policy initiative in Central and Eastern Europe. This initiative was the Regional Aerospace Initiative (RAI). The RAI's goal, extracted from Presidential Review Directive 36, was to

> "...establish a region-wide civil/military airspace management and air sovereignty system in Central and Eastern Europe."

The RAI, and the programs that were inspired by its example, were designed to enhance the following elements: airspace management, command and control, military and civilian cooperation within a country, and cooperation throughout a region.

To discuss specifics of the initiative for a moment, the RAI and its children were U.S.-led bilateral initiatives with countries of Central and Eastern Europe, conducted in the spirit of North Atlantic Treaty Organization's Partnership for Peace (PfP) program. The Office of the Secretary of Defense, International Security Affairs section, oversaw RAI studies conducted by the U.S. Air Force's Electronic Systems Center.

As the initial reviews of countries' abilities and plans for civil/military airspace management came to completion, it became apparent that all the countries wished to modernize their airspace management along certain core concepts. For example, all the countries surveyed lacked an ability to display all actions within their airspace, both civil and military, in a single display format compatible with Western standards. From this lack came the recommendation for an Air Sovereignty Operations Center (ASOC). This unique program combined the best expertise and efforts of the countries with a "starter kit" provided by the United States. The ASOC combines air defense and air traffic control (ATC) radar inputs, provided by the country, to form an integrated air picture of the entire country and surrounding territories. The ASOC was designed to accept the use of Western European radar data formats in order to best encourage cooperation not only between civil and military airspace managers within a country, but within a region as well.

Second, it also became apparent that the military's ability to contribute to such an air picture was hampered by their lack of compatible primary radars. Rather than incur massive debt in the procurement of 3D radar, it was suggested that the countries study the feasibility of modernizing their older surveillance radars to ASOC (i.e., European) requirements. The radar interoperability and life cycle upgrade studies (RADIUS) are a U.S. attempt to answer those feasibility questions.

Additionally, it became apparent that the countries wished to modernize their navigational aids to meet International Civil Aeronautics Organization (ICAO) and NATO standards. The resulting navigational aids (NAVAIDS) studies provided a systematic, incremental set of agreed-upon modifications required by the countries to modernize their military navigational systems and landing aids.

As the RAI, ASOC and NAVAIDS programs began to move, it was quickly realized that, if these initiatives were not accompanied by similar efforts in modernizing and Westernizing

command and control, the countries would miss a significant opportunity to plan their changes systematically. The need to tie stand-alone systems together into integrated systems was clear. If steps were not taken quickly, the cost to Europe and NATO would be enormous. Among other efforts at various levels, OSD met the challenge with the command, control, communications and computers (C4) study program for Central Europe, designed to review and develop systematic, incremental recommendations for a country to plan its modernization and regionalization of command and control functions and processes.

Much as the conduct of RAI led to the development of ASOC, the command, control, communications and computer studies began to identify common challenges for the countries. The concept for a National Military Command Center (NMCC) began as a potential answer for some of these challenges. The air picture created by ASOC would be critical to national leaders during a crisis, but an air picture alone is not sufficient to respond to national crisis. The technology now exists to fuse the air, ground and sea assets of both military and civilian organizations in real time, to provide a response package unmatched in history for any national crisis. This potential is now being explored in the development of the National Crisis Management Center for the nations of Central and Eastern Europe.

The overview now being complete, the details of each of these programs will be discussed starting with the basic RAI Program.

Regional Airspace Initiative

At the Prague Summit, President Clinton offered a U.S. initiative for regional airspace management modernization for Central and Eastern Europe. President Clinton selected this initiative as one which could be offered as U.S. assistance to foster regional cooperation. Specifically, the initiative offered assistance in designing a regional civil/military ATC/air sovereignty architecture which would emphasize joint civil/military resource sharing and regional cooperation to minimize the cost of satisfying host country ATC and air sovereignty requirements. The underlying concept was that modernization of ATC capabilities could be leveraged to achieve a corresponding modernization of air sovereignty capabilities at a lower cost. The intended objectives for ATC modernization were to realize the efficiency of regional cooperation and to achieve full compliance with Eurocontrol and European air traffic harmonization and integration program standards. The intended objectives for air sovereignty modernization were to improve the efficiency of civil and military cooperation, increase operational effectiveness, promote regional cooperation and facilitate future integration with NATO systems, a subject of substantial interest to the U.S. In this regard, the U.S. offer of assistance in developing modernized air sovereignty architectures was equally an initiative in support of NATO's Partnership for Peace initiative.

The RAI studies were initiated in June 1994. The initial effort focused on four nations - Czech Republic, Hungary, Poland and Slovakia. The RAI studies have expanded to include the countries shown in Figure 1. The study direction focused on three components of air space management, civil ATC, military ATC, and air sovereignty. The studies found that, in general, the ATC capabilities were more modern and interoperable than the air sovereignty capabilities and there were real opportunities to improve the efficiency of military airspace management by leveraging the civil ATC capabilities. Additionally, the RAI studies recommended the sharing of radar data with neighboring nations as a means of improving radar coverage while promoting regional cooperation. The RAI studies also lead to the establishment of regional conferences where all the participating nations could share information and explore common concerns relative to airspace management. As a result, a foundation for bilateral and multi-lateral cooperation in airspace management has been established.
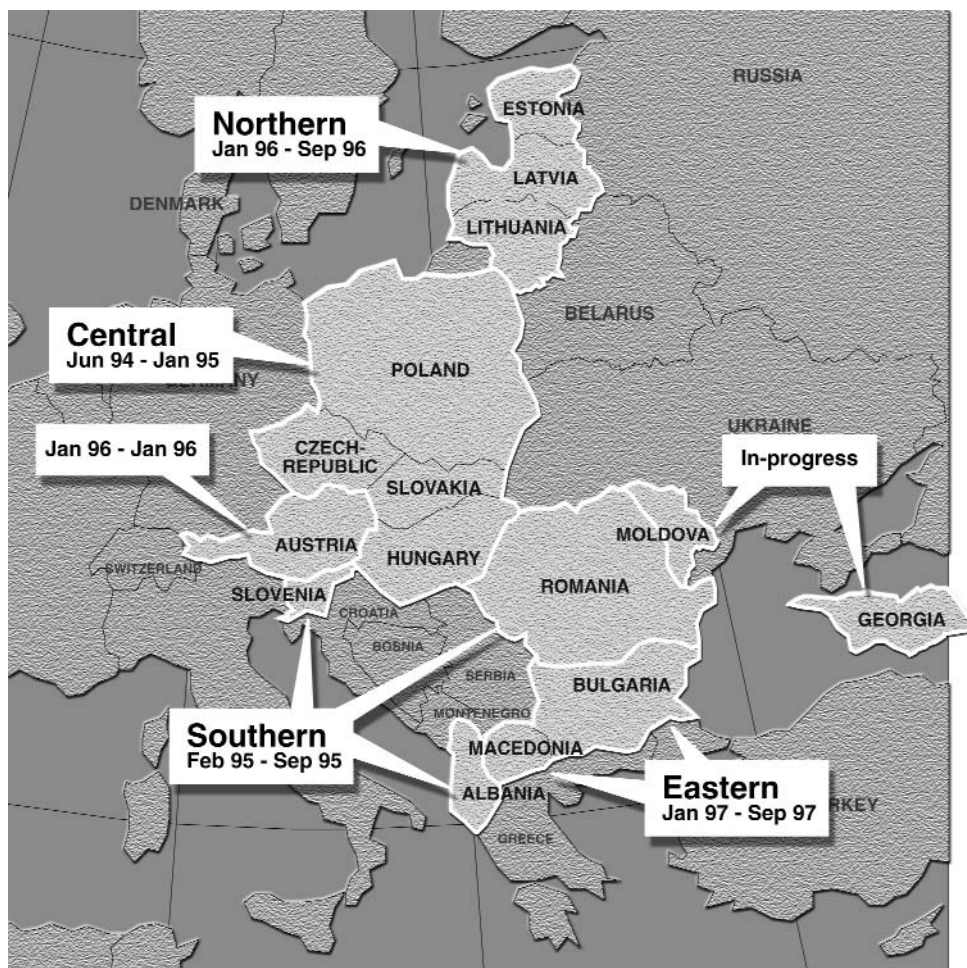
Figure 1. Nations Involved in RAI

Air Sovereignty Operations Center

The ASOC grew out of the recommendation for a centralized surveillance and control capability from the RAI studies. By pursuing a common air sovereignty core system under a single program, participating nations could obtain a basic capability at a lower cost than if they pursued this type of modernization effort individually. In addition, the key concepts of promoting cooperation internally between civil ATC and military and regional information sharing were intended to be incorporated into the ASOC program.

ASOC supports the processing of radar data from both civil ATC and military radars to support situation awareness and the processing of ICAO flight plan data to support aircraft identification. The Eurocontrol ASTERIX format was selected as the standard format for radar data inputs to the ASOC to ensure that data from military radars could more easily be used in support of civilian ATC. The use of a standard radar data interface also supported cross-border radar data exchange in accordance with bilateral agreements. The ability to exchange air track data using a NATO tactical data link interface also supported regional information sharing in accordance with bilateral and multi-lateral agreements. This tactical data link interface was instrumental in facilitating the integration of the Czech Republic, Hungary and Poland into the NATO air defense system.

The majority of the nations participating in the RAI studies have elected to participate in the ASOC program. ASOCs are currently installed in the Czech Republic, Estonia, Hungary, Latvia,

Lithuania, Poland, Romania, Slovakia, and Slovenia. Bulgaria is currently in the process of obtaining an ASOC.

Radar Interoperability and Life cycle Upgrade Study

In January 1998, a new study effort known as RADIUS was initiated to determine the feasibility of modernizing existing Soviet-legacy two-dimensional radars in the PfP nations to provide digital output compatible with the ASOC, and to reduce maintenance and operation costs. A second aim of the program is to devise a plan for redistributing surplus radars offered by individual PfP nations to meet surveillance deficiencies elsewhere in the region. Because of the very high cost of purchasing new three-dimensional radars and the fact that these nations had little capital to invest, this radar re-engineering program could provide a reasonable air defense radar coverage for a fraction of that cost for approximately eight to ten years. This would give receiver nations time to develop a procurement plan that will meet both operational needs and budget constraints.

Navigation Aids

Since 1989, Central and Eastern European countries have moved rapidly to modernize and improve civil and military communications, navigation, surveillance/air traffic management (CNS/ATM) systems for both en route and terminal service. In several areas, great strides have been made, particularly in civil CNS/ATM infrastructure modernization. On the military side progress has been significantly slower due to budget constraints and deliberation over alternatives and their impacts on avionics. The sustainment cost of aging Soviet-legacy air base navigation equipment is rapidly increasing, but an equally important problem continues to remain, the incompatibility between civil and military CNS/ATM systems, which restricts military operations and negatively impacts training. As some of these nations join NATO, and others continue their pursuit of NATO membership, the compatibility of their units and airfields with NATO/ICAO systems and procedures also adds an additional layer of complexity. Through the conduct of NAVAIDS studies, the U.S. has been able to make substantive recommendations to the host nations that markedly improve the margins of flying safety for aircraft in the host nations' area of operations, and identify modernization alternatives that facilitate increased military and civil cooperation.

Observations made while conducting the RAI studies led the U.S. to suggest that a broader look at command and control (C2) functions and NAVAIDS be initiated. These NAVAIDS studies result in recommendations for modernizing airfield and aircraft navigation systems based upon appropriate consideration of civil, military, NATO requirements and issues. Within the basic framework of the study country's requirements and modernization planning, alternative NAVAID system configurations are defined. These alternatives reflect military options consistent with the available funding, required upgrade time frame, NATO/ICAO guidance, and expected developments and constraints in the use of landing system options. Both current and advanced navigation techniques are considered in the evaluation and recommendations process. Particular attention is placed on identifying modernization solutions that closely integrate military and civil operations, and provide a synthesized architecture that satisfies both military and civil interoperability requirements. The study evaluates the following interoperability areas: en route navigation, precision approach, non-precision approach, air-ground communications, avionics, and approach lighting.

Hungary was the first country for the initial effort in 1996. Since then, NAVAIDS studies have been completed in Bulgaria, Czech Republic, Latvia, Lithuania, Poland, Romania, and the Slovak Republic with several of those nations directly using the results of the study to modernize their navigation systems. Studies are currently being conducted with Albania and Croatia.

Command, Control, Communications and Computers Studies

Because of the RAI studies and the derivative ASOC, NAVAIDS studies and RADIUS program were so successful in promoting civil, military and regional cooperation in air traffic control, in 1996 OSD decided to extend the RAI concept. Building on the theme of cooperation and collaboration, both domestic and international, in concert with USEUCOM and its theater engagement strategy, OSD decided to apply the RAI lessons to the world of military command, control, communications and computers (C4).

Historically, the U.S. Department of Defense had focused its efforts on improving the organic C4 system capabilities of the U.S. armed forces. In the 1990s, as multinational coalition peace keeping and peace enforcing became the dominant military operations, it became important for U.S. forces to have C4 systems that were interoperable with those of our potential partner countries. Consequently, in order to address U.S. and coalition partner C4 system interoperability issues, it became necessary to extend U.S. C4 systems modernization activities to address critical C4 systems interoperability issues for multinational partner countries as shown in Figure 2. This extension of U.S. C4 systems planning was, in fact, fully consistent with the enhanced military cooperation objectives of the PfP initiative.
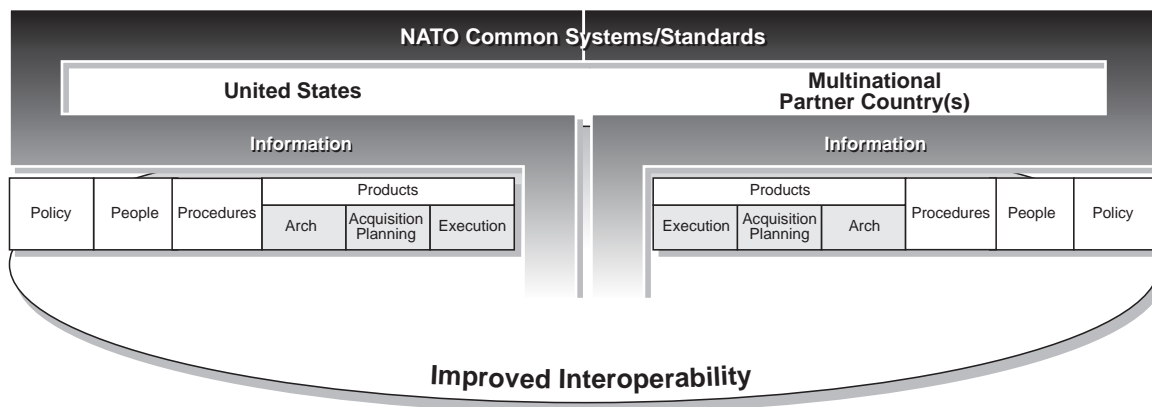

Figure 2. Improving C4 System Interoperability

The principal objectives of the C4 studies program were twofold: to evaluate the readiness of potential U.S. partner's C4 systems to support interoperability with NATO and U.S. forces in multinational coalition operations, and to propose low cost modernization actions designed to improve the C4 systems interoperability posture of potential partner nations. To achieve this objective, NATO systems and standards provide a common ground where nations can meet. The scope of the C4 studies is very broad, addressing a wide range of information exchange mechanisms. Components include voice, message and data communications, military command and control information systems, air and naval mission planning systems, air defense systems and automated collaborative planning tools to promote international cooperation in coalition operations. At present, studies have been conducted for Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovenia, and the Slovak Republic. Studies are ongoing in Albania and Croatia. These countries have used the study results to develop road maps for funding modernization and prioritizing the application of limited national funds to attain the most effective, cooperative military C4 system capabilities.

National Military Command Center

In the course of executing the C4 studies discussed above, a common thread emerged from the analysis of national capabilities and on-going modernization plans. All nations involved in

the studies were engaged in planning for the introduction of centralized information collection and processing systems to support the management of resources (both military and civil) in crisis situations. In response to the apparent need for a centralized crisis management capability, the U.S. Air Force Electronic Systems Center developed a concept for implementation of a national command center for crisis management. This command center, identified as the National Military Command Center (NMCC), would support both national civil and military crisis situations and, in keeping with the over-arching objectives of OSD policy and the PfP initiative, would also support regional collaboration in response to regional crisis situations. Thus, this concept grew from the C4 studies program just as the ASOC grew from the RAI program. In both cases, the fundamental objective was to promote cooperation between military and civil authorities within a nation and collaboration among nations to apply limited resources to solve regional problems.

The NMCC is a centralized data integration, information processing, display and distribution facility to provide national-level coordinated management for military and civil crisis response. It is controlled and operated by the Ministry of Defense, with civil agency participation. The NMCC uses interfaces with service headquarters, national military information sources, national civilian agencies, and regional or foreign organizations to receive and disseminate information. Figure 3 illustrates different scenarios in which the NMCC can provide support to manage crisis response operations.
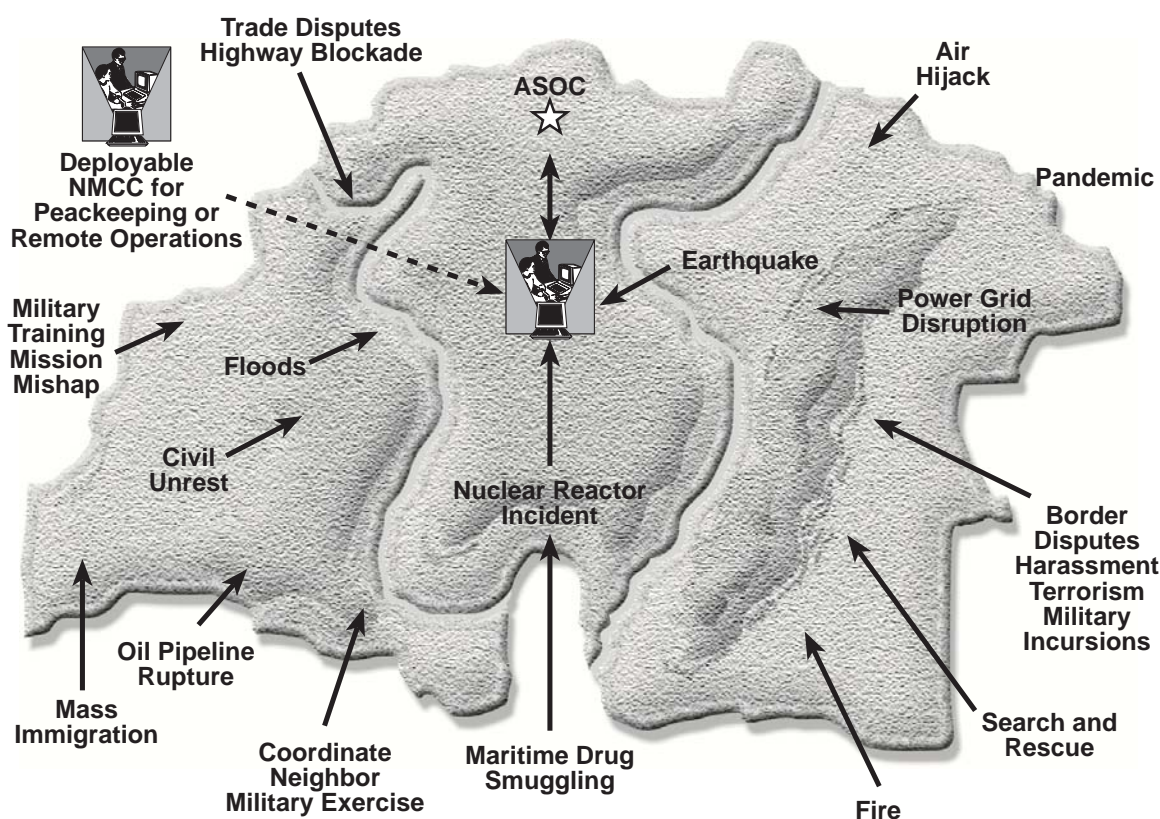
Figure 3. NMCC Support to Crisis Management Operations

In support of crisis management activities, the primary functional capabilities of the NMCC are as follows:

- Situation Monitoring - Collection and correlation of crisis information from military services, intelligence sources, civil sources, commercial news services, etc.

- Situation Assessment - Evaluation of force capabilities, planning for resource application, use of mapping displays, access to national emergency planning information, access to flight plan information and air situation awareness via the ASOC, etc.

- Crisis Relief Action Coordination - Coordinate civil and military relief actions and resource allocation to help ensure critical needs are satisfied and avoid duplication of efforts. Examples of relief actions might include coordination and prioritization of flight plans for search and rescue actions, coordination of extraordinary airlift requirements during disaster responses and coordination of air traffic management during multinational disaster relief missions. In this capacity, the NMCC may serve a liaison role with the Committee for European Airspace Coordination (CEAC) and Eurocontrol.

At present, some 12 PfP nations are actively involved in planning for the NMCC system. Operational capabilities have been defined and the technical architecture developed.

Summary and Conclusions

On the behalf of OSD and in conjunction with USEUCOM, ESC has assumed the role of a catalyst for promoting cooperation and collaboration in Central and Eastern Europe, cooperation between military and civil national entities and collaboration among disparate nations. The individual studies and acquisition programs which grew from a simple RAI initiative have had a profound impact in causing formerly isolated nations to address mutual problems, including airspace and air traffic management, from a combined perspective. The relationship and synergism between OSD initiatives and the Partnership for Peace program is illustrated in Figure 4. As shown in the figure, OSD initiatives directly support the work program elements which have been established under the PfP work program.

As illustrated in the figure, executing the OSD initiatives for Eastern European countries is not only a mechanism to improve coalition partner capabilities, but is also in the best interests of the U.S. These initiatives will improve the ability of U.S. forces to interoperate with coalition partners and, consequently, make the conduct of U.S. operations more effective and less costly.
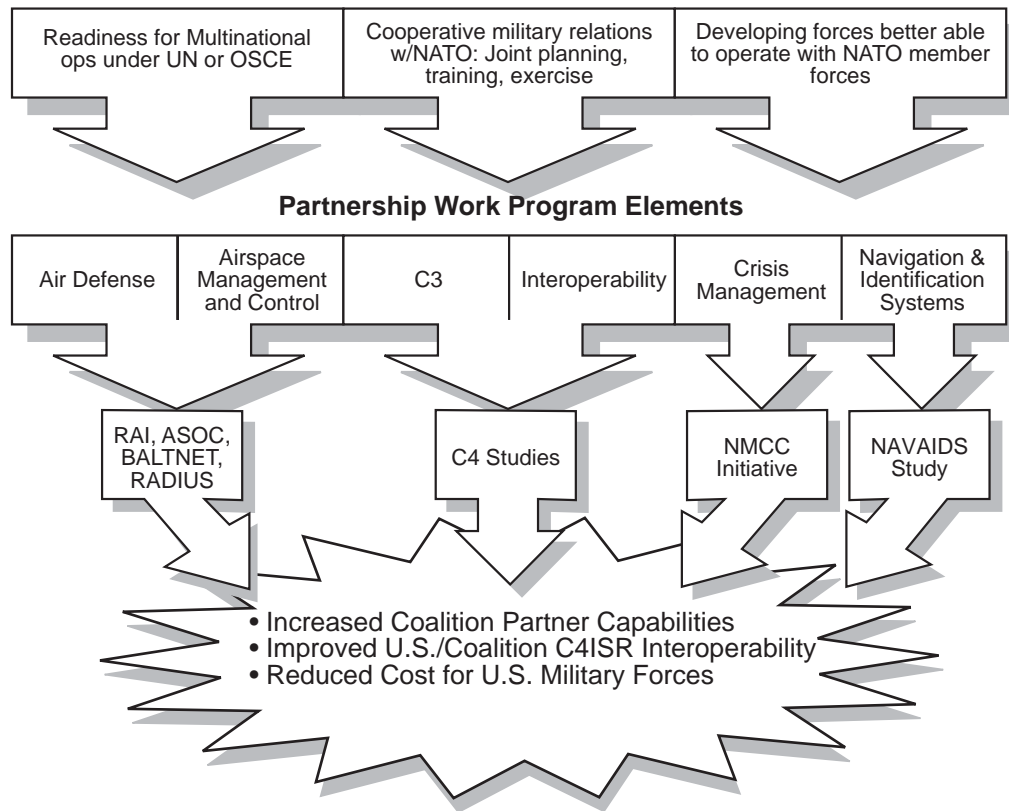
Figure 4. OSD/PfP Policy Integration Activities

About the Author

Neil R. Planzer is Associate Director for Civil Aviation, Office of the Deputy Chief of Staff for Air and Space Operations, Headquarters U.S. Air Force, Washington, DC. He also serves as Executive Director of the Department of Defense Policy Board on Federal Aviation. In this role, he is responsible for civil aviation interface and policy formulation for all department matters associated with federal aviation, air-space management, air traffic control and international aviation. Neil served as a flight engineer while on active duty with the U.S. Air Force and while assigned to the Pennsylvania Air National Guard. He began his civil service career in June 1973 as an air traffic controller for the Federal Aviation Administration. During twenty-five years with the Federal Aviation Administration, he held a variety of controller and management positions in aviation.